

TEST REPORT

Reference No. : WTS16S1165060-5E
FCC ID..... : 2AKHBFT101
Applicant..... : Fantem Technologies (Shenzhen) Co., Ltd
Address..... : 5th Floor, Yingtang Building, South 5th Road, HI-tech Park, Nanshan District, Shenzhen, Guangdong, China
Manufacturer..... : Fantem Technologies (Shenzhen) Co.,Ltd
Address..... : 5th Floor, Yingtang Building, South 5th Road, HI-tech Park, Nanshan District, Shenzhen, Guangdong, China
Factory : Fantem Technologies (Shenzhen) Co., Ltd
Address..... : North, 3/F, Yitao Technology Industrial Park, Baihua Yuan Rd., The Second Industrial Area, Guangming Sub-districtOffice, Guangming New District, Shenzhen, Guangdong, China
Product Name..... : Cube
Model No. : FT101-A
Brand : Fantem
Standards..... : FCC CFR47 Part 1.1307
Date of Receipt sample..... : Nov. 11, 2016
Date of Test..... : Nov. 12 – 30, 2016
Date of Issue : Dec. 24, 2016
Test Result..... : **Pass**
Note..... : This report is for RF Exposure

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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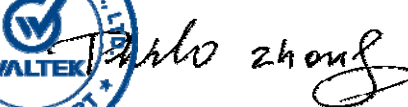
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2 **Contents**

	Page
1 COVER PAGE.....	1
2 CONTENTS	2
3 REVISION HISTORY	3
4 GENERAL INFORMATION	4
4.1 GENERAL DESCRIPTION OF E.U.T.	4
4.2 DETAILS OF E.U.T.	4
4.3 CHANNEL LIST	5
4.4 TEST FACILITY	7
5 EQUIPMENT USED DURING TEST.....	8
5.1 EQUIPMENTS LIST	8
5.2 MEASUREMENT UNCERTAINTY	9
5.3 TEST EQUIPMENT CALIBRATION	9
6 RF EXPOSURE	10
6.1 REQUIREMENTS.....	10
6.2 THE PROCEDURES / LIMIT.....	10
6.3 MPE CALCULATION METHOD	11

3 **Revision History**

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS16S1165060-5E	Nov. 11, 2016	Nov. 12 – 30, 2016	Dec. 09, 2016	original	-	replaced
WTS16S1165060-5E	Nov. 11, 2016	Nov. 12 – 30, 2016	Dec. 23, 2016	revision1	updated test report	replaced
WTS16S1165060-5E	Nov. 11, 2016	Nov. 12 – 30, 2016	Dec. 24, 2016	revision1	updated test report	valid

4 General Information

4.1 General Description of E.U.T.

Product Name	: Cube
Model No.	: FT101-A
Model Description	: N/A
Wi-Fi Specification	: 2.4G: 802.11b/g/n HT20/n HT40
Bluetooth Version	: Bluetooth v4.0 Containing Classic and LE mode
Z-wave	: Support
NFC	: Support, working on passive mode.
Hardware Version	: AA
Software Version	: 1.0.0.1

4.2 Details of E.U.T.

Operation Frequency	: Wi-Fi: 802.11b/g/n HT20: 2412~2462MHz 802.11n HT40: 2422-2452MHz Bluetooth: 2402~2480MHz Z-wave: 908.40MHz,908.42MHz
Max. RF output power	: Wi-Fi(2.4G): 9.40dBm Bluetooth: 8.30dBm Z-wave: 99.87dBuV@3m
Type of Modulation	: Wi-Fi: CCK, OFDM Bluetooth: GFSK, Pi/4 DQPSK,8DPSK Z-wave: FSK NFC: ASK/2ASK
Antenna installation	: Wi-Fi/Bluetooth: internal permanent antenna Z-wave: internal permanent antenna NFC: Frame antenna
Antenna Gain	: Wi-Fi: 1.5dBi Bluetooth: 1.5dBi Z-wave: -3dBi
Technical Data	: DC 5V, 2A powered by adapter (Adapter Input: 100-240V~, 50-60Hz, 0.25A)
Adapter	: Manufacturer: ME TECHNOLOGY Co., LTD Model No.: G101U-050200B-1

4.3 Channel List

Z-wave Test Mode			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	908.40	1	908.42

Bluetooth Classic mode

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2403	2	2404	3	2405
4	2406	5	2407	6	2408	7	2409
8	2410	9	2411	10	2412	11	2413
12	2414	13	2415	14	2416	15	2417
16	2418	17	2419	18	2420	19	2421
20	2422	21	2423	22	2424	23	2425
24	2426	25	2427	26	2428	27	2429
28	2430	29	2431	30	2432	31	2433
32	2434	33	2435	34	2436	35	2437
36	2438	37	2439	38	2440	39	2441
40	2442	41	2443	42	2444	43	2445
44	2446	45	2447	46	2448	47	2449
48	2450	49	2451	50	2452	51	2453
52	2454	53	2455	54	2456	55	2457
56	2458	57	2459	58	2460	59	2461
60	2462	61	2463	62	2464	63	2465
64	2466	65	2467	66	2468	67	2469
68	2470	69	2471	70	2472	71	2473
72	2474	73	2475	74	2476	75	2477
76	2478	77	2479	78	2480	-	-

Bluetooth LE mode

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404	2	2406	3	2408
4	2410	5	2412	6	2414	7	2416
8	2418	9	2420	10	2422	11	2424
12	2426	13	2428	14	2430	15	2432
16	2434	17	2436	18	2438	19	2440
20	2442	21	2444	22	2446	23	2448
24	2450	25	2452	26	2454	27	2456
28	2458	29	2460	30	2462	31	2464
32	2466	33	2468	34	2470	35	2472
36	2474	37	2476	38	2478	39	2480

Wi-Fi mode

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462	12	2467
13	2472	14	-	15	-	16	-

4.4 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A-1, October 15, 2015.

- **FCC Test Site 1#– Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.

- **FCC Test Site 2#– Registration No.: 328995**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 328995, December 3, 2014.

5 Equipment Used during Test

5.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.15,2016	Sep.14,2017
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.15,2016	Sep.14,2017
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.18,2016	Apr.17,2017
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.15,2016	Sep.14,2017
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.18,2016	Apr.17,2017
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.18,2016	Apr.17,2017
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.16,2016	Mar.15,2017
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.09,2016	Apr.08,2017
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	Sep.15,2015	Sep.14,2017
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.15,2015	Sep.14,2017
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Sep.15,2015	Sep.14,2017

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 **RF Exposure**

Test Requirement: FCC Part 1.1307

Evaluation Method: FCC Part 2.1091 & KDB 447498 D01 General RF Exposure Guidance v06

6.1 **Requirements**

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

6.2 **The procedures / limit**

(0) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength E (V/m)	Magnetic Field Strength H (A/m)	Power Density S (mW/ cm ²)	Averaging Time $ E ^2, H ^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength E (V/m)	Magnetic Field Strength H (A/m)	Power Density S (mW/ cm ²)	Averaging Time $ E ^2, H ^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

6.3 MPE Calculation Method

$$S = PG * \text{Duty factor} / 4\pi d^2$$

P = Peak Power Input to antenna (Watts)

G = Antenna Gain (numeric)

d = distance to the center of radiation of antenna (in meter) = 0.20 m

Note:

$$1) P (\text{Watts}) = (10^{(\text{dBm} / 10)}) / 1000$$

$$2) G (\text{Antenna gain in numeric}) = 10^{(\text{Antenna gain in dBi} / 10)}$$

$$3) \text{Duty factor} = 1$$

$$4) \pi = 3.142$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
1.5 (for Wi-Fi)	1.413	9.40	8.71	0.00245	1
1.5 (for Bluetooth Classic)	1.413	8.30	6.76	0.00190	1
1.5 (for Bluetooth LE)	1.413	4.65	2.92	0.000821	1
For Z-wave					
Frequency(MHz)	E _{Meas} (dBuV/m)	EIRP(dBm)	EIRP(mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
908.42	99.87	4.67	2.93	0.000583	0.61
EIRP=E _{Meas} +20log(d _{Meas})-104.7, S=EIRP / 4πd ² Where EIRP is the equivalent isotropically radiated power, in dBm E _{Meas} is the field strength of the emission at the measurement distance, in dBuV/m d _{Meas} is the measurement distance, in m					

=====End of Report=====